Scientific Inquiry

5-1 The student will demonstrate an understanding of scientific inquiry, including the foundations of technological design and the processes, skills, and mathematical thinking necessary to conduct a controlled scientific investigation.

5-1.2 Identify independent (manipulated), dependent (responding), and controlled variables in an experiment.

Taxonomy Level: 1.1-B Remember Conceptual Knowledge

Previous/Future knowledge: In 4th grade (4-1.5), students recognized the correct placement of variables on a line graph. In 7th grade (7-1.5), students will explain the relationship between independent and dependent variables in controlled a scientific investigation through the use of appropriate graphs, tables, and charts.

It is essential for students to know that in an experiment there are three types of variables.

- The manipulated variable (changed or tested in the experiment) is also called the *independent variable*.
- The variables that are kept the same, or unchanged, in the experiment are called the *controlled variables*.
- The responding variable (the result of, or response to, the manipulated variable) is also called the *dependent variable*.

For example, a student conducts an experiment to test whether changing the surface of the floor will increase the distance a toy car will roll. The student uses carpet, rubber mat, and the floor. When the car is pushed with the same amount of force on each surface, the student finds that it rolls farther on the floor than the carpet or rubber mat. The independent (manipulated) variable is the surface of the floor. The controlled variables are the size of the carpet and rubber mat, the same toy car, and the force with which the car is pushed. The dependent (responding) variable is the distance the car rolled.

NOTE TO TEACHER: Students should be using both terms independent (manipulated) and dependent (responding) when describing variables.

Assessment Guidelines:

The objective of this indicator is to *identify* variables in an experiment; therefore, the primary focus of assessment should be to recognize a variable as independent (manipulated), dependent (responding), and controlled in an experiment.